



Note

***Narcine atzi* Carvalho & Randall, 2003 (Pisces: Narcinidae) - an addition to Indian ichthyofauna**

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ABSTRACT

A species of electric ray of family Narcinidae, *Narcine atzi* Carvalho & Randall, 2003 has been recorded for the first time from Indian waters. Five specimens of *N. atzi* in the length range of 343-415 mm (TL) were collected from demersal shrimp trawl catches at Visakhapatnam, central eastern coast of India. The present paper provides description on morphometric characters of the species along with a comparative account on earlier descriptions.

Keywords: Description, First record, Indian waters, *Narcine atzi*, Numb fish

In recent years, various revision studies on electric rays revealed that some genera are more diverse than previously understood (Carvalho *et al.*, 2000). Twenty species of small to medium-sized batoids belonging to the genus *Narcine* Henle, 1834 (numbfishes) of the order Torpediniformes (Carvalho and Randall, 2003) are distributed in the tropical Indo-west Pacific region.

Day (1878) described one species *Narcine timlei* under the family Torpedinidae in Indian waters. Munro (1955) reported two species *viz.*, *Narcine brunnea* and *N. timlei* and Sujatha (2002) provided key to three species *viz.*, *N. brunnea*, *Narcine maculata* and *N. timlei* from Visakhapatnam waters. Akhilesh *et al.* (2014), reported six species of genus *Narcine* (*N. brunnea*, *N. lingula*, *N. prodorsalis*, *N. timlei*, *N. oculifera* and *N. maculata*) and one species of genus *Benthobatis* in the family Narcinidae from Indian waters in their updated checklist of Chondrichthyans. In addition to the above six species under the genus *Narcine* that are reported from Indian waters, the present study reports for the first time, one more species *Narcine atzi* Carvalho and Randall, 2003, a new numb fish hitherto unknown from Indian waters, from the trawl catches of Visakhapatnam region. As per IUCN Red List, this species is assessed as 'data deficient' (DD) (Carvalho and McCord, 2009). The present paper provides detailed description of this species.

Samples were collected during May to August 2015, from Visakhapatnam Fisheries Harbour where catches from nearby fish landing centres are also brought for sale. Visakhapatnam coast is known for its rocky habitats and their associated fish species. Commercial trawlers fish within 17°10'-18°10'N and 82°50'E to 84°10'E that

extends from Kakinada in the south to Gopalpur in the north, in the depth range between 30-220 m along east coast of India. The total length (TL) of the specimens was taken from tip of snout to caudal fin tip and measured to nearest mm. Identification of specimens, descriptions and terminology for morphometric characters follow Carvalho *et al.* (2002) and Compagno and Heemstra (2007). External and morphometric measurements were taken following Bigelow and Schroeder (1953).

Five specimens of *N. atzi* (length range 343-415 mm TL) were collected from trawl catches of Visakhapatnam, of which there were three females and two males.

Taxonomic and morphometric details

Class : Chondrichthyes
Order : Torpediniformes
Family : Narcinidae
Genus : *Narcine* Henle, 1834
Narcine atzi Carvalho and Randall, 2003
Fig. 1, Table 1

***Narcine atzi* Carvalho and Randall, 2003**

Narcine atzi Carvalho and Randall, 2003, Ichthyol Res., 50: 59-66 (Type Locality: Oman, Arabian Sea)
Common name - Atz's numb fish

Diagnostic characters: Disc subovate, eyes smaller than spiracles. Interspiracular distance lesser than interorbital distance. Gill slits with small central lobe extending backwards. Mouth width more than internarial width. Pre-orbital snout length greater than pre-nasal snout length. Pelvic fins originate ventral to insertion of posterior disc margins. Origin of first dorsal fin anterior to level of pelvic fin insertion.

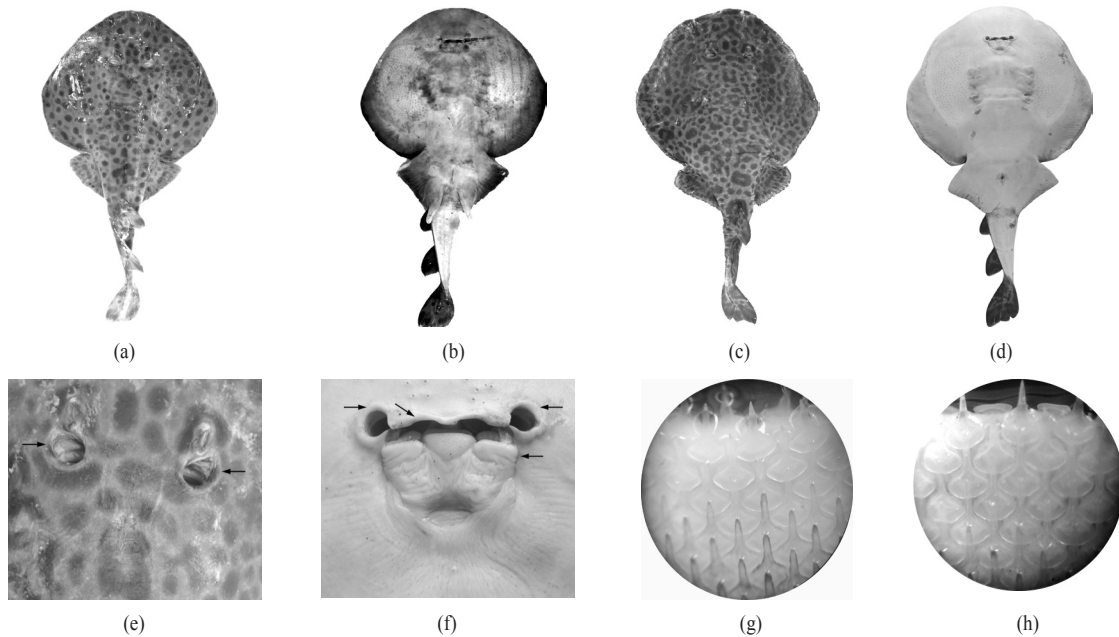


Fig. 1. *Narcine atzi* Carvalho & Randall, 2003

(a) Dorsal view (343 mm - male), (b) Ventral view (343 mm - male), (c) Dorsal view (407 mm - female), (d) Ventral view (407 mm - female), (e) Eyes and spiracles showing spots in the spiracular walls, (f) Mouth and nostrils, (g) Upper tooth band (showing cusps), (h) Mandibular tooth band

Colour: Arrangement of spots follow a pattern where a single larger spot is encircled by seven to eight spots. Some spots are isolated, rounded to oval and some fused forming vermiculations. Spots present within the spiracular walls. Large rounded blotches encircle the two dorsal fin bases.

Description: Disc sub-ovate and broadly wide, slightly posterior to its mid length. Head broad and depressed. Snout rounded and broad (Fig. 1a, c). Eyes oval, dorsolateral, partially medial and anterior to spiracles. Spiracles just behind the orbits; spiracles subcircular, broad and distinguished with elevated borders, width measuring more than length (Fig. 1e). Interspiracular distance lesser than interorbital distance. Gill slits wide, distance between the gill slits gradually decreases from first to fifth gill slits (Table 1); gill slits with small central lobe extending backwards. A pair of large kidney-shaped electric organs rests on pectoral fins which are visible through skin emerging from the level of nostrils and spread till the fifth gill slits (Fig. 1b, d). Mouth length wider than internarial width (Fig. 1f). Tooth bands broad, much wider than long; tooth bands on both the jaws with cuspidate teeth, equal in size; teeth numerous with nearly flat base with long and pointed cusp; out of 26 and 25 rows of teeth, 11 rows with prominent cusps (Fig. 1g, h). Anterior rows of teeth remain exposed when the mouth is closed and these teeth with worn down and short cusps. Nostrils circular, posterior border slightly elevated. Anterior nasal flaps short but medially expanded

and fused into a broad nasal curtain. Nasal curtain not covering the upper exposed tooth band; few sensory pores present around the mouth and nostrils (Fig. 1f). Pre-orbital snout length greater than pre-nasal snout length. Pectoral fins originating at anterior edge of snout lateral to snout tip, attached to head and ending opposite to the origin of pelvic fins. Pelvic fins originate ventral to insertion of posterior disc margins, extends posteriorly to two thirds of first dorsal fin base. In males, the posterior lobes of the pelvic fins are straight leaving a small free lobe near the attachment to the claspers, whereas in females it is on the lateral sides of the trunk. Calcified claspers extending beyond the pelvic fins were observed in the two sexually mature male specimens in the present study. Origin of first dorsal fin anterior to level of pelvic fin insertion. Distal part of first dorsal fin rounded; second dorsal fin slanted with acute apex. Distance between second dorsal and caudal fin lesser than interdorsal space. Tail moderately stout at base. Prominent flap-like ventro-lateral tail folds originates in between first and second dorsal fins extending posterior to caudal peduncle. Caudal fin asymmetrical.

Colour: Disc brown dorsally, with close set of dark brown spots distributed all over the disc which vary in size (equal to or smaller than eye diameter). The arrangement of spots follows a pattern where a single larger spot is encircled by seven to eight spots. Some spots are isolated, rounded to oval and some fused forming vermiculations. Spots present within spiracular walls. Small spots present on dorsal and

Table 1. Morphometric comparisons of *Narcine atzi*, expressed as % of total length (TL)

<i>Narcine atzi</i> TL (mm) 343-415, n=5, ♂=2 (TL 343, 389); ♀=3 (TL 365, 407, 415)			Carvalho and Randall (2002) <i>Narcine atzi</i> n=5, CAS 58398 (Srilanka), CAS 98157(Myanmar); 3 ♂ pups (107-113 mm TL) data same as holotype. Mean and SD based on all specimens			
Measurements	Range	Mean±SD	Holotype	CAS 58398	CAS 98157	Mean±S.D
			Tl 310 mm ♀	Tl 298 mm ♀	Tl 360 mm ♀	
			% TL	%TL	%TL	
Disc width	47.40-55.39	50.91±3.16	58.4	53.7	52.2	54.8±3.2
Disc length	42.41-47.17	44.70±2.08	54.2	47.0	50.0	50.4±3.6
Snout length	11.57-13.02	12.14±0.56	-	-	-	-
Snout, pre-orbital	11.81-12.60	12.26±0.33	12.8	10.9	12.6	12.1±1.1
Snout, pre-oral	11.81-13.27	12.61±0.53	14.1	15.3	15.3	14.9± 0.7
Snout, pre-nasal	11.51-12.53	11.87±0.43	7.1	10.2	12.0	9.8± 2.5
Eye diameter	1.37-1.97	1.61±0.24	2.6	3.2	2.6	2.8± 0.3
Interorbital distance	6.71-7.47	7.12±0.33	5.9	6.8	6.0	6.2± 0.5
Spiracle length	1.97-2.57	2.24±0.26	2.8	2.6	2.3	2.5± 0.3
Spiracle width	2.74-3.21	2.92±0.18	3.3	3.4	2.9	3.2± 0.3
Interspiracular distance	5.75-6.88	6.03±0.48	5.3	5.8	5.1	5.4± 0.4
Orbit±spiracle length	4.08-4.67	4.31±0.24	-	-	-	-
Pectoral base	38.56-40.79	39.65±1.04	-	-	-	-
1 st Dorsal height	7.71-10.07	9.22±0.92	11.3	11.6	9.8	10.9± 1.0
1 st Dorsal base length	6.94-7.87	7.42±0.37	8.5	7.6	6.4	7.5± 1.0
2 nd Dorsal height	8.74-10.50	9.75±0.71	8.9	9.6	8.5	9.0± 0.6
2 nd Dorsal base length	7.47-8.45	7.99±0.35	7.3	5.8	5.6	6.2± 0.9
Interdorsal space	3.86-4.96	4.45±0.40	5.9	7.4	6.6	6.6± 0.8
2 nd Dorsal to upper caudal distance	3.56-5.14	4.12±0.65	6.4	6.8	6.8	6.7± 0.2
Caudal height upper lobe	14.91-18.92	17.05±1.67	15.7	15.2	14.6	15.2± 0.6
Caudal height lower lobe	12.08-14.50	13.64±0.96	13.4	13.8	14.8	14.0± 0.7
Caudal margin length	9.25-12.04	10.03±1.14	-	-	-	-
Tail height at caudal origin	2.46-3.08	2.82±0.24	-	-	-	-
Tail width at caudal origin	2.57-2.74	2.66±0.07	-	-	-	-
Lateral tail fold length	20.64-24.94	22.45±1.90	-	-	-	-
Head length; ventral	30.60-33.42	31.79±1.07	-	-	-	-
Head length; dorsal	18.31-19.66	18.82±0.60	-	-	-	-
Mouth width	4.63-5.90	5.20±0.47	7.0	7.3	7.1	7.1± 0.2
Upper tooth band width	2.31-3.01	2.51±0.29	2.9	2.6	1.8	2.4± 0.6
Lower tooth band width	2.31-3.01	2.51±0.29	2.6	-	1.5	2.0± 0.8
Internarial width	4.93-5.54	5.22±0.25	4.6	5.0	5.1	4.9± 0.2
Nasal cut length	1.45-4.96	2.42±1.43	2.2	2.1	1.6	2.0± 0.3
Nasal curtain width	4.66-5.83	5.27±0.43	4.5	4.8	5.6	5.0± 0.5
1 st gill slit length	1.80-2.70	2.39±0.39	-	-	-	-
3 rd gill slit length	2.06-3.44	2.80±0.53	-	-	-	-
5 th gill slit length	1.54-2.47	2.12±0.44	-	-	-	-
Space between 1 st gill slits	12.34-14.52	13.88±0.92	13.6	14.0	15.3	14.3± 0.9
Space between 3 rd gill slits	10.03-12.60	11.90±1.07	-	-	-	-
Space between 5 th gill slits	8.23-10.81	9.42±0.92	7.5	8.8	8.6	8.3± 0.7
Pelvic fin length	16.14-18.08	16.56±0.85	21.3	16.3	16.7	18.1± 2.8
Pelvic fin width	14.40-18.37	17.07±1.56	39.0	34.2	33.6	35.6± 3.0
Pelvic fin end to 1 st dorsal origin	6.30-7.62	6.86±0.49	-	-	-	-
Anterior margin of pelvic fin	9.25-10.81	10.10±0.58	13.5	11.3	12.3	12.4± 1.1
Posterior margin of pelvic fin	13.70-18.08	16.37±1.62	17.7	16.1	17.9	17.2± 1.0
Snout to pelvic origin	43.15-46.68	44.91±1.54	-	-	-	-
Snout to mid of cloaca	49.87-52.09	51.10±0.93	53.2	51.7	50.0	51.6± 1.6
Snout to 1 st dorsal origin	58.02-60.27	59.39±0.89	60.0	58.1	55.6	57.9± 2.3
Snout to 2 nd dorsal origin	71.14-72.33	71.85±0.57	-	-	-	-
Snout to maximum disc width	35.48-39.07	37.19±1.47	24.2	26.2	30.6	27.0± 3.3
Snout to 1 st gill slit	22.41-25.55	23.70±1.15	-	-	-	-
Mid of cloaca to tail end	49.40-51.60	50.45±0.78	47.1	47.7	47.2	47.3± 0.3
Electric organ length	20.96-23.01	22.18±0.80	24.5	22.8	21.1	22.8± 1.7
Electric organ greatest width	9.86-14.25	11.86±1.67	12.3	9.4	9.7	10.5± 1.6
Electric organ width at 1 st gill slit	9.86-11.79	10.46±0.79	-	-	-	-
Clasper length	3.56-3.79	3.65±0.09	-	-	-	-
Clasper outer length	11.30-12.54	11.70±0.51	-	-	-	-
Clasper-cloaca length	12.04-13.41	12.33±0.61	-	-	-	-
Maximum tail width at pelvic fin	15.17-19.41	17.67±1.76	18.6	18.7	16.4	17.9± 1.3
Cloaca length	3.60-4.91	4.36±0.54	-	-	-	-

caudal fins. Ventral colouration uniform white but edges of disc and pelvic fin margins grey. Two to three rows of spots present on ventral fins. Large rounded blotches encircle the two dorsal fin bases. Single large spot present towards edges of dorsal fins and caudal fin and a crescent shaped spot present on the two dorsal fin bases.

Morphometric data of present specimens of *Narcine atzi* are in agreement with Carvalho and Randall (2003), who observed that the first dorsal fins are clearly taller than second dorsal fin and pre-orbital snout length is not as great as pre-oral snout length. In the present specimens, second dorsal equal to or slightly taller than first dorsal fin and pre-orbital snout length equal to or not as great as pre-oral snout length (Table 1).

Narcine atzi can be distinguished from other closely resembling species of the genus *Narcine* of this region on the basis of disc shape, origin of dorsal fins and colour pattern. Disc: Sub ovate in *N. atzi* vs oval in *N. lingula*, subovate in *N. indica* and *N. maculata*, shovel shaped in *N. prodorsalis*, First dorsal fin origin: anterior to level of pelvic fin insertion in *N. atzi* vs posterior to pelvic fin insertion in *N. lingula*, *N. indica*; opposite to pelvic fin insertion in *N. maculata*, *N. prodorsalis* Colour pattern: Dorsal surface with a few spots fused forming vermiculations in *N. atzi* vs a few spots fused forming pear shaped markings in *N. lingula*; a few elongated chocolate brown spots in *N. indica*; large rounded dark brown spots in *N. maculata*; a few circular spots fused in *N. prodorsalis*. Spiracle: Spots present within the spiracular walls in *N. atzi* vs spots not present in the spiracular walls in *N. lingula*, *N. indica*, *N. maculata* and *N. prodorsalis*.

Numbfishes are circumglobal in distribution and occur on upper continental slopes, from the intertidal down to depths of 1,071 m (Carvalho *et al.*, 2000). *N. atzi* was reported from Gulf of Oman, Sri Lanka and Myanmar by Carvalho and Randall (2003). This is the first record of this species from Indian waters. During recent years, at Visakhapatnam, vessels extended operation of trawl nets deeper into the sea (even upto 200-300 m) bringing in more varieties of demersal fishes that include numb fishes. A wide variety of these species are occurring in the catches ever since the extension of fishing operations to deeper waters.

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